DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the plating method of manufacturing a hot-dip-zincing steel strip without involvement of an oxide.

[0002]

[Description of the Prior Art]In the continuous hot dipping facility, after heating a steel strip with a reduction annealing furnace and activating the surface, the steel strip is introduced into the hot-dipping bath via a snout. The hot dipping metal is permeating into a snout and a steel strip is immersed in a hot-dipping bath from the surface of hot water in a snout. Therefore, if foreign matters, such as SCUM and dross, are floating to the surface of hot water, a foreign matter will be involved in a hot-dipping bath with penetration of a steel strip. When a hot dipping metal adheres to steel strip surfaces, it is accompanied to a hot dipping metal, and the foreign matter near the steel strip surfaces is easy to be carried into a hot-dipping layer. As a result, a hot-dipping layer is made to generate a defect, a steel sheet surface becomes uneven and appearance and product characteristics are spoiled by dross length. In order to prevent oxidation of the hot dipping metal in a snout, various methods are proposed from the former. For example, in JP,7-145465,A, inactive gas was sent in near the surface of hot water in a snout, generating of SCUM was prevented, and dust adhering to steel strip surfaces is removed.

[0003]

[Problem(s) to be Solved by the Invention]However, when blowing inactive gas near the surface of hot water in a snout, the blown inactive gas goes up the inside of a snout contrary to the running direction of a steel strip. Evaporation of Zn in Zn bath surface is promoted with a rise of inactive gas, and Zn steam invades into the inside of a turn roll or an annealing furnace. Zn steam which invaded carries out condensation adhesion at a roll or a furnace internal. If an

affix contacts fall or a steel strip on a steel strip, it will become a cause of surface discontinuity. Therefore, in order to prevent generating of surface discontinuity, the periodical maintenance in a furnace is required.

[0004]

[Means for Solving the Problem]By being thought out that such a problem should be solved and blowing inactive gas with big mass into a snout, as well as oxidation of Zn, this invention controls evaporation and an object of this invention is to manufacture a hot-dip-zincing steel strip without a defect. A hot dip galvanizing method of this invention carries out the opening of the gas blowing-in pipe to a snout where it extended from an annealing furnace of continuation hot dip galvanizing equipment, and a lower end was immersed in a hot-dipping bath in order to attain the purpose, Inactive gas with with a specific gravity of two or more big mass is blown off from said gas blowing-in pipe near the surface of hot water in a snout. Xe, Rn, Kr, SF_6, etc. are used as inactive gas with big mass.

[0005]

[Embodiment of the Invention]As shown in drawing 1, the running direction D is deflected with the deflector roll 2, and the steel strip 1 by which hot dip zincing is carried out is introduced into the hot-dipping bath 3 via the snout 3, after reduction annealing is carried out. Although the Zn alloy containing Zn and 0 to 55% of the weight of aluminum are used for the hot-dipping bath 3, on these specifications, these are named generically and it is called hot dip zincing. The steel strip 1 goes around the sink roll 5 immersed in the hot-dipping bath 4, and can pull up it from the hot-dipping bath 3. After spraying gas on the steel strip 1 immediately after raising from the wiping device 6 and adjusting plating coating weight, it is sent into an alloying furnace (not shown) if needed. At this time, the steel strip 1 blows the inactive gas 8 with big mass into the snout 3 in the neighborhood which reaches the surface of hot water in the snout 3 from the gas blowing-in pipe 7 which carried out the opening into the snout 3.

[0006]Xe (specific gravity 4.53) with 2 or more, large mass, and specific gravity nonpoisonous as the inactive gas 8 to air, Rn (specific gravity 7.70), Kr (specific gravity 2.82), SF_6 (specific gravity 5.11), etc. are used. The inactive gas 8 stagnates in the about nine surface of hot water in the snout 3, without flowing through the inside of the snout 3 into the running direction D and opposite direction of the steel strip 1, since mass is large. Therefore, a seal will be carried out by the surface of hot water 9 with the inactive gas 8, it is isolated from the annealing atmosphere gas which invades from a reduction annealing furnace, and oxidation is controlled. By with a specific gravity of less than two nitrogen (specific gravity 0.97) with comparatively small mass, and Ar (specific gravity 1.38), diffusion of the inactive gas into the snout 3 is not avoided for the inactive gas to be used.

[0007]The inactive gas 8 with big mass does not flow backwards the inside of the snout 3, or even if it flows backwards unlike inactive gas, such as nitrogen and Ar, it is slight. Therefore, it

is suppressed by the back run of inactive gas that evaporation of Zn is promoted, and it needs to provide neither a seal roll nor a septum in the snout 3 by it. Since it is in the tendency for Zn evaporation to be accelerated by the inactive gas which flows backwards the inside of the snout 3 when blowing this point and lightweight inactive gas, it is necessary to divide snout 3 about nine-surface of hot water inside by the seal roll or a septum. However, even if it provides a seal roll and a septum, Zn to which it was not avoided that Zn carries out condensation adhesion, but it adhered checks a smooth run of the steel strip 1 there. Thus, by using inactive gas with big mass, oxidation and evaporation of Zn are suppressed and a quality hot-dip-zincing steel strip is manufactured.

[0008]

[Example]0.35 mm of board thickness and the steel strip 1 of 1,000 mm of board width were introduced into the hot-dipping bath 4 (aluminum [0.18 % of the weight of], remainder Zn) with a temperature of 460-480 **, and hot dip zincing was carried out by target-coating-weight 120 g/m^2. The influence of dross generating set the travel speed of the steel strip 1 as a part for 176-m/which appears most notably. Xe gas and N_2 gas were blown into the snout 3 by the flow for 1-m^3/from the gas blowing-in pipe 7, the dross generation state which is floating to the surface of hot water 9 in the snout 3 was observed, and the dross length occurrence frequency in the obtained hot-dip-zincing steel strip was investigated.

[0009]In the comparative example which blew nitrogen gas into the snout 3, a lot of dross was observed by the surface of hot water 8 in the snout 3, and the dross length which also becomes the obtained product with surface discontinuity was detected so that the results of an investigation of Table 1 might see. On the other hand, in the example of this invention which blew Xe gas into the snout 3, generating of dross is suppressed thoroughly and dross length was not detected by the product, either. The coating weight of Zn which carries out condensation adhesion was also substantially reduced to the snout internal of the deflector roll 2 grade.

[0010]

表１：ドロス発生状況及びドロス引きに及ぼす不活性ガス種の影響

	Ｎ₂ 吹込み	Ｘｅ吹込み
スナウト内のドロス発生	多量発生	検出されず
製品裏面のドロス引き数	１個／１００ｍ	な　し

[0011]

[Effect of the Invention]Inactive gas with big mass is made to stagnate near the surface of hot water in a snout in this invention, as explained above.

Therefore, zincky oxidation and evaporation are controlled.

Therefore, it is not accompanied to the steel strip introduced into a hot-dipping bath in dross etc., and the hot-dip-zincing steel strip with which the healthy plating layer was formed is manufactured. In order that Zn steam which flows backwards may also reduce the inside of a snout, Zn which carries out condensation adhesion decreases on several kinds of parts in a snout and an annealing furnace, and the maintenance of a continuous hot dipping facility also becomes easy.

[Translation done.]